

Part I

Beyond Einstein

Beyond Einstein is a bold attack on the deepest mysteries of nature. The program will study the building blocks of our own existence at the most basic level: the matter, energy, space, and time that create the living Universe. *Beyond Einstein* missions will extend the reach of humanity to the ultimate extremes: the birth of the Universe, the edges of space and time near black holes, and the darkest spaces between the galaxies. Together these studies will help us understand how the matter and energy of the Universe come to life.

Beyond Einstein missions will connect humans to the vast Universe far beyond the Solar System, to the entirety of creation. They will extend our senses beyond what we can imagine today: to the largest and smallest things, the beginnings and ends of time and space. The images and knowledge gained in this quest will inspire all humanity—as only NASA can.

***Beyond Einstein* Science Objectives and Research Focus Areas.**

NASA Agency Goal: Explore the Solar System and the Universe beyond.

Science Objective 1. Find out what powered the Big Bang.

Research Focus Area 1. Search for gravitational waves from inflation and phase transitions in the Big Bang.

Research Focus Area 2. Determine the size, shape, age, and energy content of the Universe.

Science Objective 2. Observe how black holes manipulate space, time, and matter.

Research Focus Area 3. Perform a census of black holes throughout the Universe.

Research Focus Area 4. Determine how black holes are formed and how they evolve.

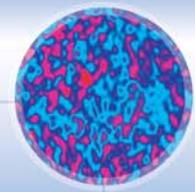
Research Focus Area 5. Test Einstein’s theory of gravity and map spacetime near the event horizons of black holes and throughout the Universe.

Research Focus area 6. Observe stars and gas plunging into black holes.

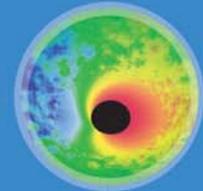
Science Objective 3. Identify the mysterious dark energy pulling the Universe apart.

Research Focus Area 2. Determine the size, shape, age, and energy content of the Universe.

Research Focus Area 7. Determine the cosmic evolution of the dark energy.



big bang



black holes



dark energy

“Gravity is the force that rules the Universe. To understand its workings, to the finest degree, is to understand the very nature of our celestial home.”
—M. Bartusiak in *Einstein’s Unfinished Symphony*